4.6 NOISE

This section includes a discussion of existing conditions and standards/guidelines associated with noise impacts, followed by an analysis of potential noise impacts resulting from implementation of DMP Update components and mitigation necessary to reduce impacts to a less than significant level.

4.6.1 Existing Conditions

4.6.1.1 Noise Descriptors

Noise is generally defined as unwanted or objectionable sound. The unit of measurement used to describe a noise level is the decibel (dB). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3 dB decrease. The human ear is not equally sensitive to all frequencies within the sound spectrum. Therefore, a method called "A weighting" is used to filter noise frequencies that are not audible to the human ear, and the abbreviation dBA notes the A-weighted decibel. Typical noise levels for common outdoor and indoor activities are shown in Table 4.6-1.

Average noise levels over a period of minutes or hours are usually expressed as dBA L_{eq}, or the equivalent noise level for that period. The period of time average may be specified; $L_{eq(3)}$ would be a 3-hour average; when no period is specified, a 1-hour average is assumed. Day-night level (L_{dn}) is the energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dBA added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

Vibration

Construction operations have the potential to result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. Ground vibration generated by construction equipment spreads through the ground and diminishes in magnitude with increases in distance. The effects of ground vibration may be imperceptible at the lowest levels, low rumbling sounds and detectable vibrations at moderate levels, and damage to nearby structures at the highest levels. To assess the potential for

Table 4.6-1
Typical Noise Levels

Common Outdoor Activities	Noise Level dBA	Common Indoor Activities
	--110--	Rock Band
Jet Fly-over at 1,000 feet (300 meters)		
	--100--	
Gas Lawn Mower at 3 feet (1 meter)		
	--90--	
Diesel Truck at 50 feet (15 meters), at 50 mph (80 km/hr)	--80--	Food Blender at 3 feet (1 meter) Garbage Disposal at 3 feet (1 meter)
Noisy Urban Area, Daytime		
	--70--	
Gas Lawn Mower, 100 feet (30 meters)		Vacuum Cleaner at 10 feet (3 meters) Normal Speech at 3 feet (1 meter)
Commercial Area	--60--	
Heavy Traffic at 300 feet (90 meters)		Large Business Office
	--50--	
		Dishwasher Next Room
Quiet Urban Daytime		
	--40--	
Quiet Urban Nighttime		Theater, Large Conference Room (background)
Quiet Suburban Nighttime		
	--30--	
		Library
Quiet Rural Nighttime		Bedroom at Night, Concert Hall (background)
	--20--	
		Broadcast/Recording Studio
	--10--	
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

Source: Caltrans 1998

structural damage associated with vibration from construction activities, the vibratory ground motion in the vicinity of an affected structure is measured in terms of peak particle velocity (ppv), typically in units of inches per second (in/sec).

4.6.1.2 Regulatory Framework

Noise

The City of Carlsbad Municipal Code, Section 8.48.010 Limitation of Hours for Construction (City of Carlsbad 1978), states the following:

> "The erection, demolition, alteration, or repair of any building or structure or the grading or excavation of land in such manner as to create disturbing, excessive or offensive noise during the following hours, except as hereinafter provided, is a violation of this code:
>
> (1) After sunset on any day, and before seven a.m., Monday through Friday, and before eight a.m. on Saturday;
>
> (2) All day on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and Christmas Day."

Section 8.48.020, Exceptions, provides the following:

> The city manager may grant exceptions to Section 8.48.010 by issuing a permit in the following circumstances:
>
> (A) When emergency repairs are required to protect the health and safety of any member of the community;
>
> (B) In nonresidential zones, provided there are no inhabited dwellings within one thousand feet of the building or structure being erected, demolished, altered or repaired or the exterior boundaries of the site being graded or excavated.

The Municipal Code does not include quantitative limits for construction noise. The City of San Diego and the County of San Diego noise ordinances state a standard of 75 dBA L_{eq}, averaged over an 8- to 12-hour period, but in practice, each jurisdiction uses 75 dBA L_{eq} averaged over 1 hour as a CEQA significance threshold. The Federal Transit Administration's

(FTA) guideline for residential receptors is 90 dBA averaged over 1 hour in the daytime, and 80 dBA averaged over 8 hours in the daytime.

The duration of the noise impact is also a factor to consider. If high noise levels persist for days or weeks, the impact is much greater than for a construction project that lasts for one or a few days. For proposed DMP Update PLDA project components, noise levels would be potentially significant if the noise at a sensitive receptor exceeded 75 dBA L_{eq}, averaged over 1 hour, and this noise level occurred for more than 3 consecutive days.

The City's Noise Guidelines Manual includes conditions that may be applied to a project to minimize construction-generated noise impacts (City of Carlsbad 1995). Prior to project approval, the project proponent may be required to produce evidence acceptable to the City that:

a. All construction vehicles or equipment, fixed or mobile, operated within 1,000 feet of a dwelling or noise sensitive use shall be equipped with properly operating and maintained mufflers.

b. Stockpiling and/or vehicle staging areas shall be located as far as practicable from dwellings and other noise sensitive receptors.

Vibration

There are no City or state standards for vibration impacts. The professional standard has been that construction vibrations pose no threat to buildings and structures due to the short-term nature of the vibrations from project activities (Caltrans 2002). Both Caltrans and the FTA recommend a 0.2 in/sec ppv level for assessment of vibrations (Caltrans 2002; FTA 1995). This is the level that would annoy people in buildings, and where there would be a risk of architectural damage.

4.6.1.3 Sensitive Noise Receptors

Noise sensitive receptors are generally considered humans engaging in activities or utilizing land uses, who may be subject to the stress of significant interference from noise. Activities usually associated with sensitive receptors include, but are not limited to, talking, reading, and sleeping. Land uses often associated with sensitive receptors include residential dwellings, hotels, motels, hospitals, nursing homes, education facilities, and libraries. Noise sensitive receptors also may include wildlife, including certain songbirds.

4.6.1.4 Program Level

Noise Levels

Noise levels in Carlsbad vary widely. A principal source of noise is vehicles on roadways. Average noise levels near I-5 can be in the range of 75 to 80 dBA L_{eq}, while noise levels in rural areas, away from major roads and other noise sources, may be in the 40 to 45 dBA L_{eq} range in the daytime and less than 40 dBA L_{eq} at night. A second notable source of noise is McClellan-Palomar Airport. The runway is oriented in the east-west direction near the boundary between Basin B and Basin C, and elevated noise levels occur principally west of the runway. The railway along the coast is another source of noise. Average noise levels near the railway when the train is passing through can be in the range of 50 to 75 dBA L_{eq}.

Sensitive Receptors

Sensitive receptors, including residences, schools, libraries, and hotels/motels, are located throughout the city.

Section 4.10 (Biological Resources) addresses the locations of noise-sensitive threatened and endangered species.

4.6.1.5 Project Level

Noise Levels

Noise level measurements were conducted within the Agua Hedionda and Calavera creeks project boundary (project components B and BN), on April 11, 2006, between 11:00 a.m. and 4:00 p.m. The weather was clear and dry with moderate breezes from the west averaging 1 to 2 miles per hour (mph) with occasional gusts of 5 to 8 mph.

Noise measurements were taken with a Larson Davis Laboratories 820 (LD-820) sound level meter set on “fast” response and “A-weighting.” The meter was positioned 5 feet above the existing ground elevation at all measurement locations. During the measurements, traffic on El Camino Real and Cannon Road was moving at approximately 40 mph. The results of the field noise measurements are summarized in Table 4.6-2 and the noise measurement locations are shown in Figure 4.6-1.

Table 4.6-2
Noise Measurement Data

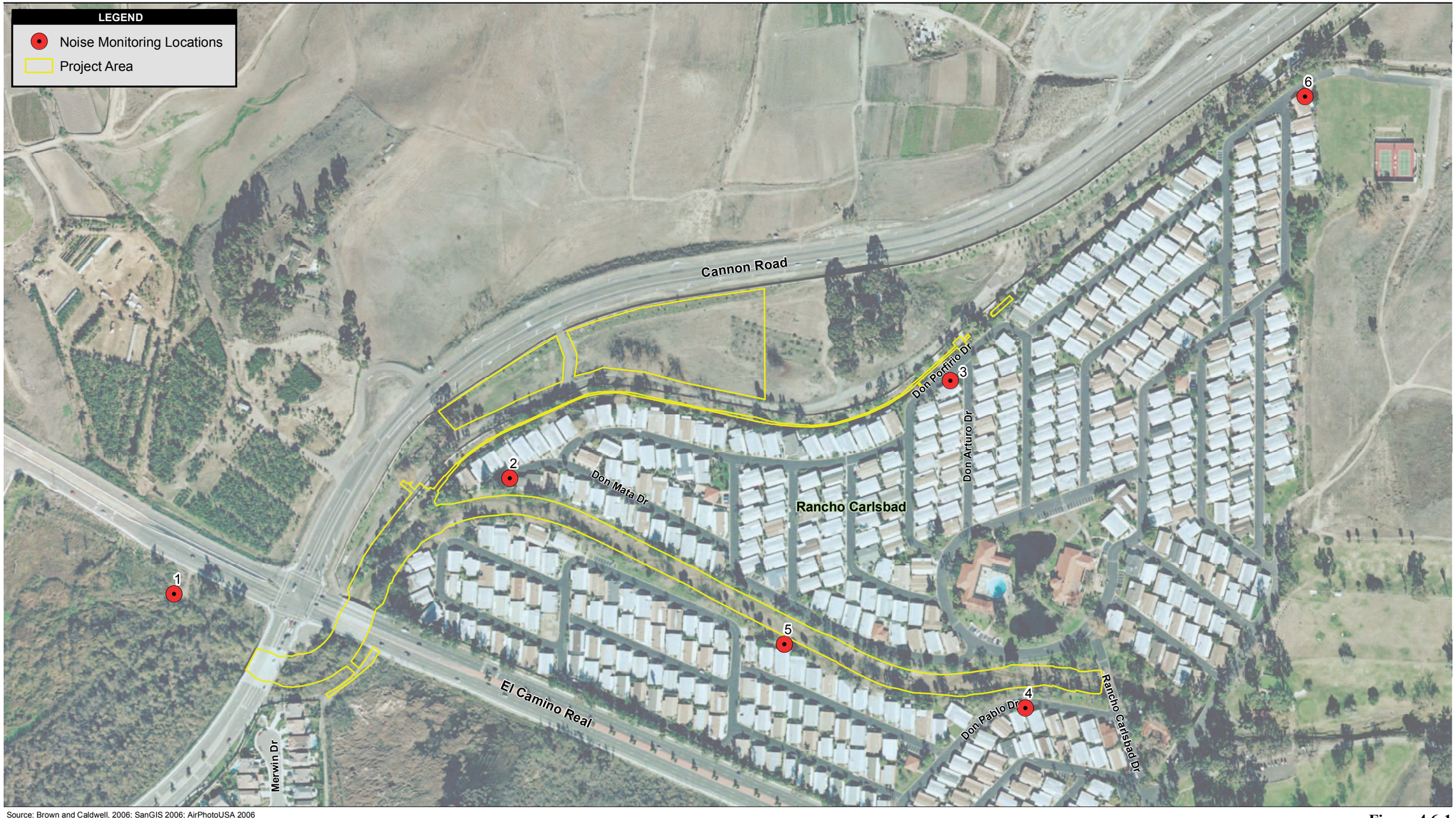
Site ID*	Location	Time	L_{eq} (dBA)	L_{min} (dBA)	L_{max} (dBA)	Noise Sources
1	Along El Camino Real (Environmentally Sensitive Habitat)	10:41 a.m. - 10:56 a.m.	55	49	69	Airplane, traffic
2	5102 Don Mata, south of construction staging area (Rancho Carlsbad)	11:02 a.m.- 11:17 a.m.	49	41	67	Traffic, airplane, birds chirping
3	317 Don Porfirio, along Calavera Creek (Rancho Carlsbad)	11:23 a.m. – 11:38 a.m.	54	43	69	Traffic, airplane, birds chirping
4	3349 Don Pablo, along Agua Hedionda Creek (Rancho Carlsbad)	12:02 p.m. – 12:17 p.m.	54	45	69	Traffic, airplane, birds chirping, yard work from a distance
5	5279 Don Ricardo, along Agua Hedionda Creek (Rancho Carlsbad)	12:24 p.m. – 12:39 p.m.	54	45	72	Traffic, airplane, birds chirping, yard work from a distance
6	Along Don Carlos, near weir wall, northeast area of the project site	12:46 p.m. – 1:15 p.m.	53	48	63	Traffic, airplane, birds chirping, yard work from a distance, water from Calavera Creek

*The Site ID corresponds to locations shown in Figures 4.6-1 and 4.6-2.

Results from the noise monitoring conducted on April 11, 2006, show existing average noise levels near the project area range from 49 to 55 dBA L_{eq}. Noise measurements taken along Calavera Creek within the Rancho Carlsbad residential community indicate existing noise levels ranged from 53 to 54 dBA L_{eq}. Noise measurements taken along Agua Hedionda Creek within the Rancho Carlsbad residential community indicate existing noise levels ranged from 49 to 54 dBA L_{eq}. Noise measurements taken near sensitive habitat indicate noise levels ranging from 54 to 55 dBA.

Sensitive Receptors

Residents of the Rancho Carlsbad residential community are considered sensitive noise receptors in the project area. Section 4.10 (Biological Resources) addresses the locations of noise sensitive threatened and endangered species.



Source: Brown and Caldwell, 2006; SanGIS 2006; AirPhotoUSA 2006

300 150 0 300 Feet

Scale: 1:3,600; 1 inch = 300 feet

Figure 4.6-1
Noise Monitoring Locations within
Agua Hedionda and Calavera Creeks Project Boundary

Path: P:\2005\05080103 Agua Hedionda-Calavera Creek Project\5GIS\Mxd\EIR\Noise Monitoring.mxd, 05/08/07, marraccinib

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4.6.2 Significance Criteria

The DMP Update project components would result in significant noise impacts if they would:

- expose persons within 50 feet of the project to generation of groundborne vibration in excess of 0.2 in/sec ppv;
- result in increased nighttime ambient noise levels;
- result in noise levels of more than 75 dBA L_{eq} (or above ambient levels, if above 75 dBA L_{eq}) over a period of more than 3 consecutive days; or
- expose people residing or working in the project area to excessive noise levels (for a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport).

4.6.3 Impact Analysis

4.6.3.1 Program Level

PLDA Project Components

Construction equipment would be the principal source of noise during implementation of proposed PLDA project components. For most equipment, such as bulldozers, trucks, loaders, and scrapers, the diesel engines of the equipment would be the loudest noise source. If jackhammers or other sorts of pavement breakers are used, the noise of the impact tool would be dominant. Table 4.6-3 shows some typical maximum noises at a distance of 50 feet from the equipment.

Table 4.6-3
Typical Construction Equipment Noise (dBA)

Equipment	Typical Noise Level (dBA L_{max}) 50 Feet from Source
Backhoe	80
Grader	85
Loader	85
Pile Driver	96-101
Jackhammer	88
Bulldozer	85
Truck	88
Scraper	89

Source: FTA 1995

Noise from two or more pieces of equipment would be greater than for one piece of equipment. Average noise levels would be less than maximum noise levels because equipment does not operate at full power all of the time, nor does it always stay in one location. With these considerations, an average noise level of 75 dBA L_{eq} at a distance of 50 feet is a conservative value for these projects, assuming pile drivers would not be required during construction of the proposed projects.

Construction equipment may be considered a point source, with noise attenuation (reduction) of 6 dBA for each doubling of distance from the source. Thus, a noise level of 80 dBA at 50 feet would be 74 dBA at 100 feet, 68 dBA at 200 feet, etc.

Many proposed DMP Update project components would be linear in nature and the noise at adjacent residences or sensitive land uses would be loudest for only a period of hours. Many projects would be located more than 50 feet from sensitive receptors, and noise levels would not be anticipated to exceed 75 dBA L_{eq} averaged over 1 hour. Therefore, potentially significant impacts would be limited to those projects with a relatively small area of work, duration of more than a few days, and a location near sensitive receptors. There would also be a potentially significant impact for any component that would require the use of pile drivers. However, noise impacts would be minimized by the implementation of project design features/methods and construction practices described in Table 3-6 of this EIR.

Although the Carlsbad Municipal Code does not specifically allow an exception to the hours of construction for nonemergency work or work within 1,000 feet of a residence, it is recognized that nighttime work may be necessary to avoid significant traffic impacts. To allow nonemergency work within the stated distance from a residence at night, the City would be required to amend Muncipal Code Section 8.48.020, which would be a separate action and is not proposed as part of the DMP Update. Nighttime construction work near sensitive receptors could interfere with sleep, which would be a potentially significant impact.

Vibration

Ground vibration levels associated with various types of construction equipment are summarized in Table 4.6-4. Table 4.6-5 presents the vibration level thresholds for architectural and structural damage and human perception thresholds. As stated above, both Caltrans and the FTA recommend a 0.2 in/sec level for assessment of impact (Caltrans 2002; FTA 1995).

Table 4.6-4
Representative Vibration Source Levels for Typical Construction Equipment

Equipment		ppv at 25 feet (in/sec)
Pile Driver (impact)	upper range	1.518
	Typical	0.644
Pile Driver (sonic)	upper range	0.734
	Typical	0.170
Large Bulldozer		0.089
Loaded Trucks		0.076
Jackhammer		0.035
Small Bulldozer		0.003

Source: FTA 1995
in/sec = inches per second
ppv = peak particle velocity

Table 4.6-5
Reaction of People and Damage to Buildings at Various Continuous[1] Vibration Levels

Effects on Structures	Effects on People	Vibration Level (in/sec ppv)
Architectural damage and possibly minor structural damage	Considered unpleasant	0.4-0.6
Threshold of risk of architectural damage to normal dwelling with plastered walls and ceilings	Annoying to people in buildings	0.2
Virtually no risk of damage	Threshold of annoyance	0.1
Recommended upper level for ruins and ancient monuments	Vibrations readily perceptible	0.08
Unlikely to cause damage of any type	Threshold of perception; possibility of intrusion	0.006-0.019

[1] Caltrans considers most construction vibrations, with the exception of pile driving and blasting, to be continuous.

Source: Caltrans 2002
in/sec = inches per second
ppv = peak particle velocity

It is seen from the tables that, if no pile driving is performed and the work is more than 25 feet from a receptor, then the vibration would be less than half of the 0.2 in/sec ppv threshold used by Caltrans and the FTA.

Non-PLDA Project Components

Noise impacts for non-PLDA project components would be the same as for PLDA project components. The use of standard design and construction practices would be the same for the non-PLDA project components as for the PLDA project components.

4.6.3.2 Operation and Maintenance

Operation and maintenance of the existing and proposed drainage facilities would require the use of various pieces of construction equipment and trucks for cleaning channels, repairing culverts, replacing bridges, and other activities as described in Section 3.3.6. Potential impacts would be similar to those described for program level PLDA project components but less likely to occur because maintenance operations would usually be of shorter duration than new construction.

4.6.3.3 Project Level

PLDA Project Components

The noise sources and generalized noise levels discussed above for the program level PLDA project components are applicable to the proposed drainage improvements within Agua Hedionda and Calavera creeks (components B and BN).

Dredging and sediment removal in Agua Hedionda and Calavera creeks would occur adjacent to the homes of Rancho Carlsbad and some equipment operations would occur within 50 feet of residences. Construction activities would only occur during daylight hours, as permitted by the City's noise ordinance. When equipment is within 50 feet, short-term noise levels would exceed 75 dBA, and 1-hour average noise levels would be likely to exceed 75 dBA. The duration of noise impact at any residence is anticipated to generally be 1 to 3 days as the dredging would proceed along each creek at approximately 50 to 100 feet per day. Because construction activity would not result in excessive noise levels (i.e., greater than 75 dBA) for a period of longer than 3 days, construction-related noise impacts would be considered less than significant.

Vibration

No pile driving would occur during construction of the project, nor would large bulldozers be anticipated in proximity to the homes. Maximum vibration at the nearest receptors would be

anticipated to be less than 0.06 in/sec ppv and would likely be less than the level of perception. Vibration levels would be less than the 0.2 in/sec ppv Caltrans standard and less than significant.

Non-PLDA Project Components

The project level non-PLDA components B and BN involve long-term maintenance efforts in Agua Hedionda and Calavera creeks. The principal sources of noise and vibration would be construction equipment. The intensity and duration of operations would be less than for the construction efforts, and the impacts would be less than described for the PLDA elements of the components.

4.6.4 Significance of Impacts

4.6.4.1 Program Level

Based on the analysis discussed above, the following potentially significant noise impacts would occur.

- There would be a potentially significant noise impact if a proposed DMP Update component would require the use of heavy construction equipment, generating noise of 75 dBA or greater within 50 feet of a sensitive receptor for a period of longer than 3 days, or if a proposed DMP Update project component would require work to be done after sunset or before 7:00 a.m., excluding holidays. (Noise-1)

- There would be a potentially significant vibration impact if a proposed DMP Update component would require the use of pile drivers, generating a vibration of 0.2 in/sec or greater at a sensitive receptor. (Noise-2)

4.6.4.2 Operation and Maintenance

Based on the analysis discussed above, the following potentially significant noise impacts would occur.

- There would be a potentially significant noise impact if a proposed operation and maintenance activity would require the use of construction equipment generating noise of 75 dBA or greater within 50 feet of a sensitive receptor for a period of longer than 3 days,

or if a proposed operation and maintenance activity would require work to be done after sunset or before 7:00 a.m. (Noise-1)

4.6.4.3 Project Level

Short-term noise and vibration impacts associated with the proposed project level components would be less than significant. No long-term noise impacts would occur.

4.6.5 Mitigation Measures

4.6.5.1 Program Level

The following mitigation measures shall be applicable to DMP Update components that shall result in potentially significant noise impacts (Noise-1 and/or Noise-2) during construction activities. Implementation of these mitigation measures will reduce impacts to a less than significant level.

Noise-1 If a proposed project component would require the use of construction equipment that may generate noise of 75 dBA or greater within 50 feet of a sensitive receptor for a period of longer than 3 days, or would require work to be done between sunset and 7:00 a.m., as permitted by Municipal Code Section 8.48.020, preparation and implementation of a project level noise evaluation shall be required. The evaluation shall assess potential noise levels and require the implementation of appropriate noise attenuation measures to reduce potential noise impacts to less than 75 dBA L_{eq} during the daytime or to 60 dBA L_{eq} at nighttime. The noise evaluation shall consider the use of temporary noise walls, noise blankets, noise-reducing enclosures for individual pieces of equipment, and engines with special mufflers as potential noise attenuation measures. Monitoring shall be required to demonstrate the effectiveness of the project-specific measures to reduce noise levels to this limit. If monitoring results indicate that the measures are not reducing noise to acceptable levels, work will cease until further environmental analysis is performed that recommends additional noise attenuation measures. For emergency projects as defined in Municipal Code Section 8.48.020(A), the requirement for evaluation, monitoring, and potential additional mitigation measures shall be performed if determined feasible by the City Engineer.

Noise-2 If a proposed project component would require the use of pile drivers, preparation and implementation of a project level vibration evaluation shall be required. The evaluation shall consider the potential vibration levels associated with project construction at the nearest structure locations. The analysis shall demonstrate that vibration levels at those structures remain below 0.2 in/sec, or a different construction technique resulting in vibration less than 0.2 in/sec shall be required.

4.6.5.2 Operation and Maintenance

Mitigation measures Noise-1 and Noise-2 above will be applicable to proposed operation and maintenance activities that would result in potentially significant noise impacts, as defined in Section 4.6.4.1. Implementation of these mitigation measures would reduce impacts to a less than significant level.

4.6.5.3 Project Level

Short-term noise and vibration impacts would be less than significant during implementation of project level DMP Update components. No mitigation measures would be required.

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